LPC-P1114 development board _____

Users Manual

  All boards produced by Olimex are ROHS compliant

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INTRODUCTION

LPC-P1114 is development board with LPC1114 ARM Cortex-M0 based microcontrollers for embedded applications from NXP. LPC-P1114 featuring a high level of integration and low power consumption. This microcontroller supports various interfaces such as one Fast-mode Plus I2C-bus interface, one RS-485/EIA-485 UART, two SSP interfaces, four general purpose timers, a 10-bit ADC. On the board are available UEXT, Debug Interface, user buttons and leds.

BOARD FEATURES

- MCU: **LPC1114** Cortex-M0, up to 50 Mhz, 32 kB Flash, 8kB SRAM, UART RS-485, two SSP, I^{2}C/Fast+, ADC
- Power supply circuit
- Power-on led
- USB connector only for power supply, not USB functionality
- Debug interface – SWD (Serial Wire Debug)
- UEXT connector
- Eight user leds
- Two user buttons
- Reset button
- Prototype area
- FR-4, 1.5 mm, soldermask, component print
- Dimensions: 80x50mm (3.15 x 1.97")

ELECTROSTATIC WARNING

The **LPC-P1114** board is shipped in protective anti-static packaging. The board must not be subject to high electrostatic potentials. General practice for working with static sensitive devices should be applied when working with this board.

BOARD USE REQUIREMENTS

Cables: USB-Mini cable is need as this board used power supply from the USB. You will also need USA A-B cable for connecting the programmers to the PC.

Hardware: To program this board you need JTAG and software which supports Cortex M0. The programmers Olimex offers are ARM-JTAG-EW which works with IAR for ARM up to version 6.20; ARM-USB-OCD, ARM-USB-OCD-H, ARM-USB-TINY and ARM-USB-TIBY-H which works only with ARM-JTAG-SWD adapter and with Rowley CrossWorks.

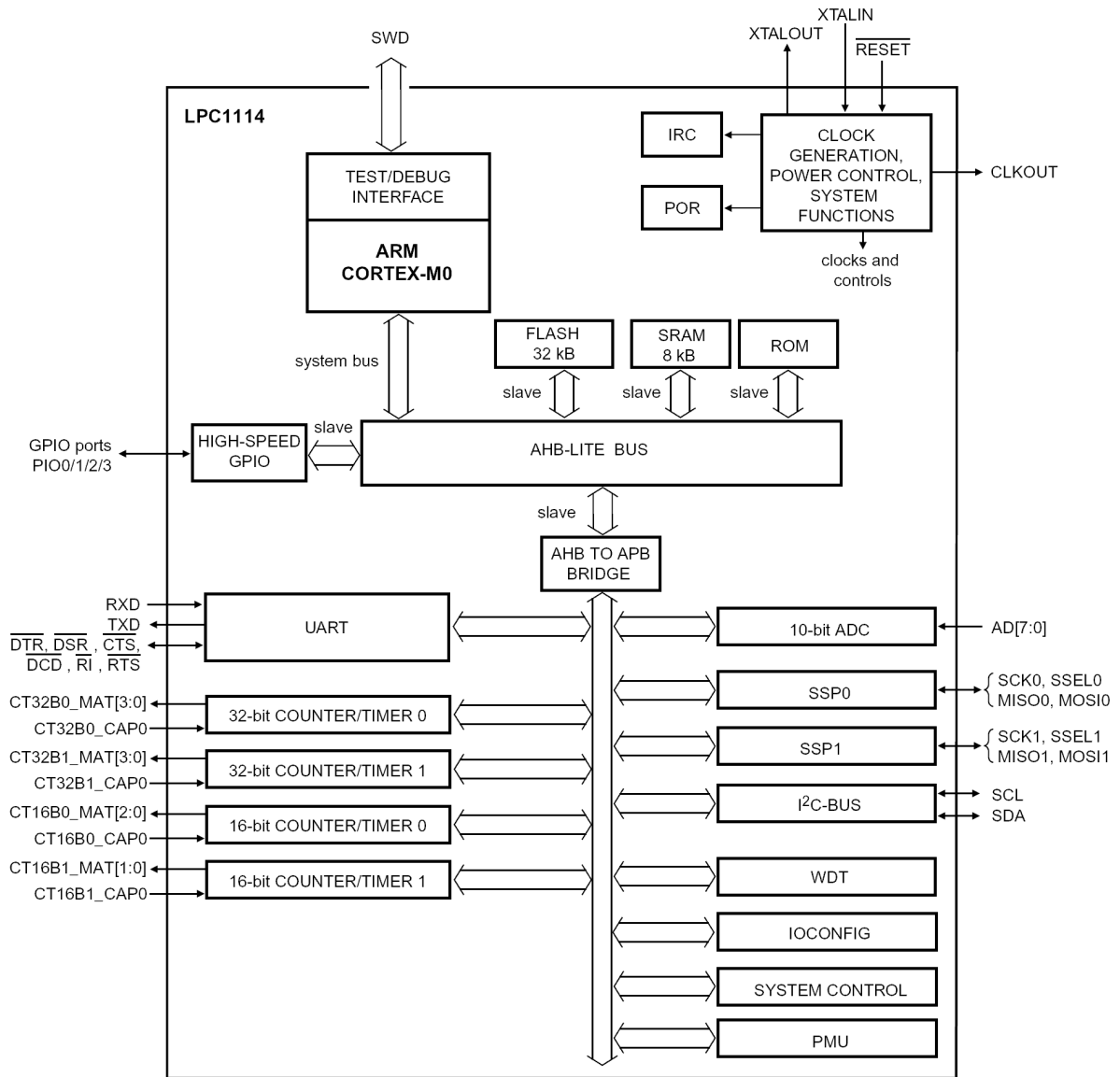**Software:** IAR for ARM up to version 6.20 and Rowley CrossWorks.

PROCESSOR FEATURES

LPC-P1114 board use ARM Cortex™-M0 microcontroller **LPC1114FBD48/301** from NXP Semiconductors with these features:
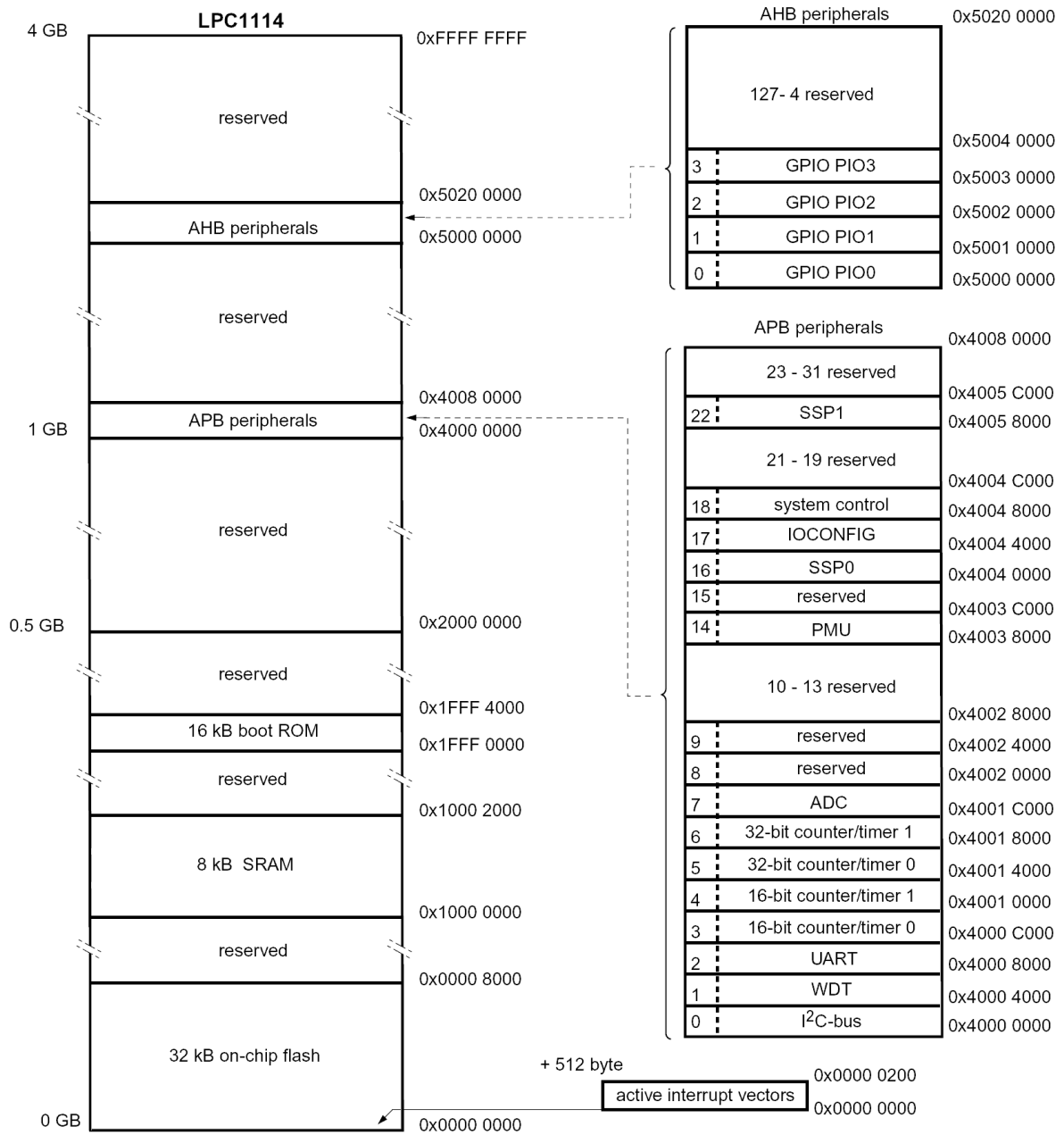
– ARM Cortex-M0 processor, running at frequencies of up to 50 MHz.

– ARM Cortex-M0 built-in Nested Vectored Interrupt Controller (NVIC).

– 32 kB on-chip flash programming memory.

– 8 kB SRAM.

– In-System Programming (ISP) and In-Application Programming (IAP) via on-chip bootloader software.

– Serial interfaces:

- UART with fractional baud rate generation, internal FIFO, and RS-485 support.

- Two SSP controllers with FIFO and multi-protocol capabilities

- I^2C-bus interface supporting full I^2C-bus specification and Fast-mode Plus with a data rate of 1 Mbit/s with multiple address recognition and monitor mode.

– Other peripherals:

- 42 General Purpose I/O (GPIO) pins with configurable pull-up/pull-down resistors.

- Four general purpose timers/counters with a total of four capture inputs and 13 match outputs.

- Programmable WatchDog Timer (WDT).
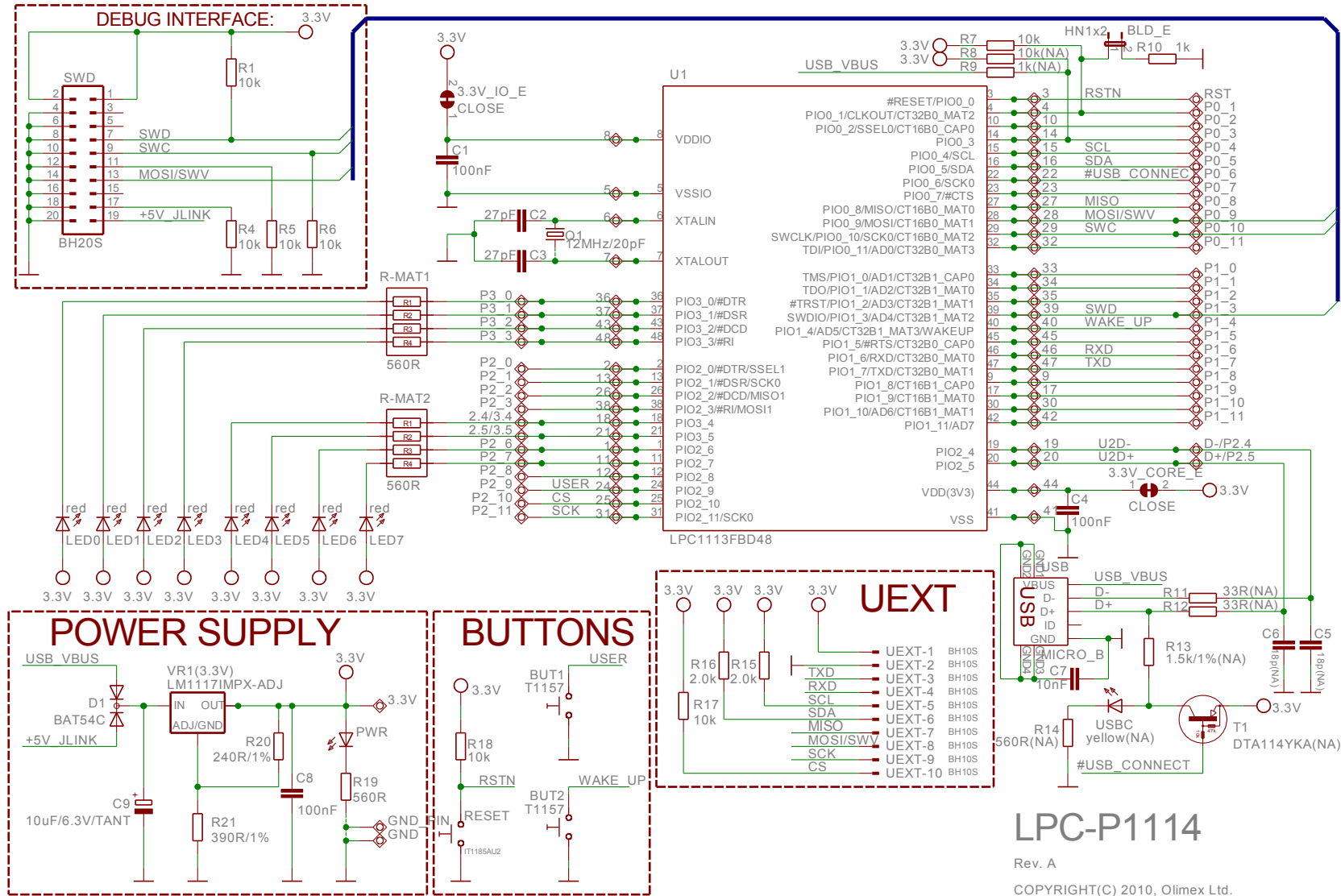
- System tick timer.

–   Serial Wire Debug.

–   High-current output driver (20 mA) on one pin.

–   High-current sink drivers (20 mA) on two I^{2}C-bus pins in Fast-mode Plus.

–   Integrated PMU (Power Management Unit) to minimize power consumption during Sleep, Deep-sleep, and Deep power-down modes.

–   Three reduced power modes: Sleep, Deep-sleep, and Deep power-down.

–   Single 3.3 V power supply (2.0 V to 3.6 V).

–   10-bit ADC with input multiplexing among 8 pins.

–   GPIO pins can be used as edge and level sensitive interrupt sources.

–   Clock output function with divider that can reflect the system oscillator clock, IRC clock, CPU clock, and the Watchdog clock

–   Processor wake-up from Deep-sleep mode via a dedicated start logic using up to 13 of the functional pins.

–   Brownout detect with four separate thresholds for interrupt and one threshold for forced reset.

–   Power-On Reset (POR).

–   Crystal oscillator with an operating range of 1 MHz to 25 MHz.

–   12 MHz internal RC oscillator trimmed to 1 % accuracy that can optionally be used as a system clock.

–   PLL allows CPU operation up to the maximum CPU rate without the need for a high-frequency crystal. May be run from the main oscillator, the internal RC oscillator, or the watchdog oscillator.
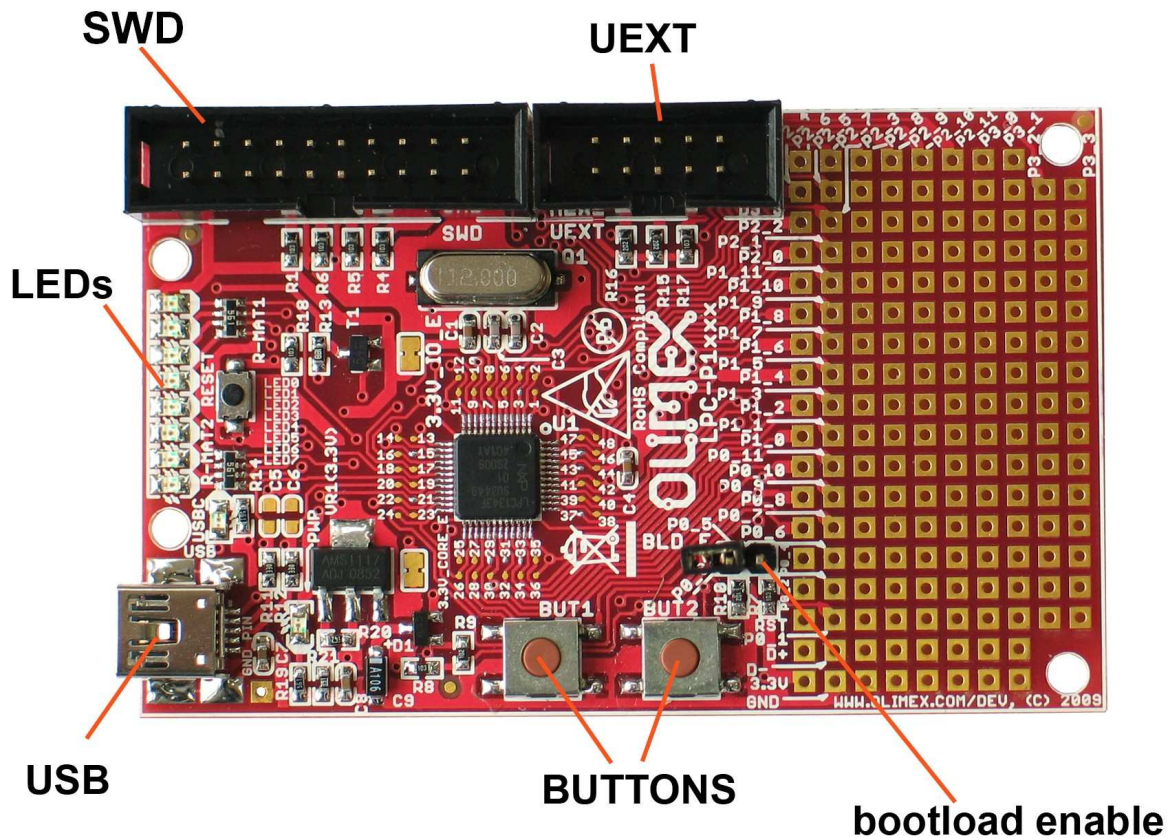
BLOCK DIAGRAM

SWD

XTALIN
XTALOUT
RESET

LPC1114

IRC

CLOCK
GENERATION,
POWER CONTROL,
SYSTEM
FUNCTIONS

CLKOUT

TEST/DEBUG
INTERFACE

ARM
CORTEX-M0

POR

clocks and
controls

system bus

FLASH
32 kB

SRAM
8 kB

ROM

slave

slave

slave

GPIO ports
PIO0/1/2/3

HIGH-SPEED
GPIO

slave

AHB-LITE BUS

slave

AHB TO APB
BRIDGE

RXD
TXD
DTR, DSR , CTS,
DCD , RI , RTS

UART

10-bit ADC

AD[7:0]

CT32B0_MAT[3:0]
CT32B0_CAP0

32-bit COUNTER/TIMER 0

SSP0

{ SCK0, SSEL0
MISO0, MOSI0

CT32B1_MAT[3:0]
CT32B1_CAP0

32-bit COUNTER/TIMER 1

SSP1

{ SCK1, SSEL1
MISO1, MOSI1

CT16B0_MAT[2:0]
CT16B0_CAP0

16-bit COUNTER/TIMER 0

I^2C-BUS

SCL
SDA

CT16B1_MAT[1:0]
CT16B1_CAP0

16-bit COUNTER/TIMER 1

WDT

IOCONFIG

SYSTEM CONTROL

PMU

MEMORY MAP

SCHEMATIC

Page 7

DEBUG INTERFACE:

SWD

SWD
SWC
MOSI/SWV
+5V_JLINK

BH20S

R1 10k

R4 10k R5 10k R6 10k

3.3V

3.3V_IO_E
CLOSE

C1 100nF

27pF C2
27pF C3
Q1
12MHz/20pF

VDDIO
VSSIO
XTALIN
XTALOUT

U1

#RESET/PIO0_0
PIO0_1/CLKOUT/CT32B0_MAT2
PIO0_2/SSEL0/CT16B0_CAP0
PIO0_3
PIO0_4/SCL
PIO0_5/SDA
PIO0_6/SCK0
PIO0_7/#CTS
PIO0_8/MISO/CT16B0_MAT0
PIO0_9/MOSI/CT16B0_MAT1
SWCLK/PIO0_10/SCK0/CT16B0_MAT2
TDI/PIO0_11/AD0/CT32B0_MAT3

TMS/PIO1_0/AD1/CT32B1_CAP0
TDO/PIO1_1/AD2/CT32B1_MAT0
#TRST/PIO1_2/AD3/CT32B1_MAT1
SWDIO/PIO1_3/AD4/CT32B1_MAT2
PIO1_4/AD5/CT32B1_MAT3/WAKEUP
PIO1_5/#RTS/CT32B0_CAP0
PIO1_6/RXD/CT32B0_MAT0
PIO1_7/TXD/CT32B0_MAT1
PIO1_8/CT16B1_CAP0
PIO1_9/CT16B1_MAT0
PIO1_10/AD6/CT16B1_MAT1
PIO1_11/AD7

PIO2_0/#DTR/SSEL1
PIO2_1/#DSR/SCK0
PIO2_2/#DCD/MISO1
PIO2_3/#RI/MOSI1
PIO2_4
PIO2_5
PIO2_6
PIO2_7
PIO2_8
PIO2_9
PIO2_10
PIO2_11/SCK0

PIO3_0/#DTR
PIO3_1/#DSR
PIO3_2/#DCD
PIO3_3/#RI

VDD(3V3)
VSS

LPC1113FBD48

R7 10k
R8 10k(NA)
R9 1k(NA)

3.3V
3.3V
USB_VBUS

HN1x2 BLD_E
R10 1k

RSTN
RST

SCL
SDA
#USB_CONNECT
MISO
MOSI/SWV
SWC

SWD
WAKE_UP

RXD
TXD

U2D-
U2D+
3.3V_CORE_E
CLOSE

C4 100nF

POWER SUPPLY

USB_VBUS

D1
BAT54C
+5V_JLINK

VR1(3.3V)
LM1117IMPX-ADJ
IN   OUT
ADJ/GND

3.3V
3.3V

PWR

R20 240R/1%

C8 100nF

R19 560R

C9 10uF/6.3V/TANT

R21 390R/1%

GND_PIN
GND

BUTTONS

3.3V

BUT1
T1157
USER

R18 10k

RSTN
RESET

IT1185AU2

BUT2
T1157

WAKE_UP

UEXT

3.3V 3.3V 3.3V 3.3V

R16 2.0k R15 2.0k

R17 10k

TXD
RXD
SCL
SDA
MISO
MOSI/SWV
SCK
CS

UEXT-1 BH10S
UEXT-2 BH10S
UEXT-3 BH10S
UEXT-4 BH10S
UEXT-5 BH10S
UEXT-6 BH10S
UEXT-7 BH10S
UEXT-8 BH10S
UEXT-9 BH10S
UEXT-10 BH10S

USB
MICRO_B

VBUS
D-
D+
ID
GND

USB_VBUS
D-
D+

R11 33R(NA)
R12 33R(NA)

R13 1.5k/1%(NA)

C7 10nF

R14 560R(NA)

USBC
yellow(NA)

#USB_CONNECT

C6 8p(NA) C5 18p(NA)

T1
DTA114YKA(NA)

3.3V

LPC-P1114

Rev. A

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BOARD LAYOUT

SWD   **UEXT**

LEDs

USB   **BUTTONS**

bootload enable

POWER SUPPLY CIRCUIT

LPC-P1114 is power supplied +5V via USB, or via JTAG.

RESET CIRCUIT

LPC-P1114 reset circuit includes LPC1114 pin 3 (#RESET/PIO0_0), R18 (10k) and RESET button.

CLOCK CIRCUIT

Quartz crystal 12 MHz is connected to LPC1114 pin 6 (XTALIN) and pin 7 (XTALOUT).

JUMPER DESCRIPTION

3.3V_CORE_E

This jumper, when closed, enables microcontroller 3.3V power supply.
Default state is closed.

3.3V(I/O)_E

This jumper, when closed, supplies 3.3 V voltage to LPC1114 pin 8 (VDDIO).
Default state is closed.

INPUT/OUTPUT

LED0 (red) connected via R-MAT1 to LPC1114 pin 36 (PIO3_0/#DTR).

LED1 (red) connected via R-MAT1 to LPC1114 pin 37 (PIO3_1/#DSR).

LED2 (red) connected via R-MAT1 to LPC1114 pin 43 (PIO3_2/#DCD).

LED3 (red) connected via R-MAT1 to LPC1114 pin 48 (PIO3_3/#RI).

LED4 (red) connected via R-MAT2 to LPC1114 pin 18 (PIO3_4).

LED5 (red) connected via R-MAT2 to LPC1114 pin 21 (PIO3_5).

LED6 (red) connected via R-MAT2 to LPC1114 pin 1 (PIO2_6).

LED7 (red) connected via R-MAT2 to LPC1114 pin 11 (PIO2_7).

Power-on LED (red) – this LED shows that +3.3V is applied to the board.

User button with name **BUT1** (USER) connected to **LPC1114** pin 24 (PIO2_9).

User button with name **BUT2** connected to **LPC1114** pin 40 (WAKEUP).

Reset button with name **RESET** connected to LPC1114 pin 3 (#RESET/PIO0_0).

EXTERNAL CONNECTORS DESCRIPTION

UEXT

Pin #	Signal Name
1	3.3V
2	GND
3	TXD
4	RXD
5	SCL
6	SDA
7	MISO
8	MOSI
9	SCK
10	CS
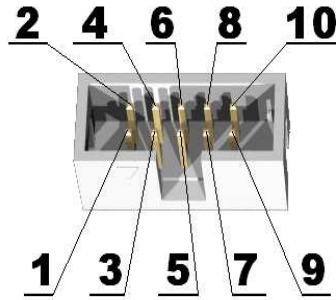
SWD
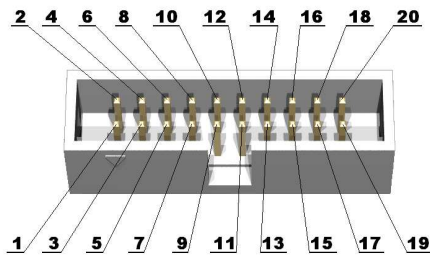
Pin #	Signal Name	Pin #	Signal Name
1	3.3V	2	3.3V
3	NC	4	GND
5	NC	6	GND
7	SWD	8	GND
9	SWC	10	GND
11	pull-down	12	GND
13	MOSI	14	GND
15	NC	16	GND
17	pull-down	18	GND
19	+5V_JLINK	20	GND

USB connector

Pin #	Signal Name
1	USB_VBUS
2	NC
3	NC
4	NC
5	GND
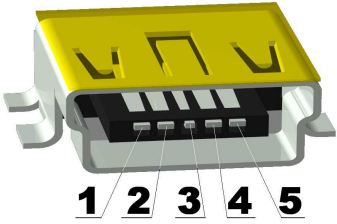
MECHANICAL DIMENSIONS
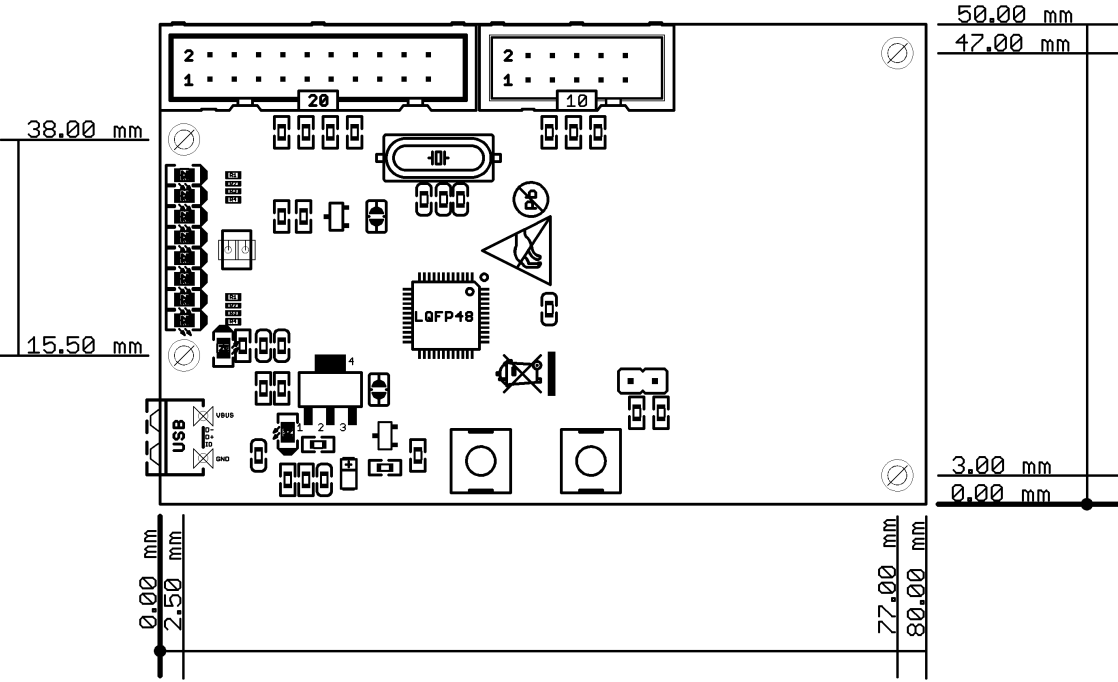
AVAILABLE DEMO SOFTWARE

- LPC1114 demo examples project for EW-ARM

ORDER CODE

LPC-P1114 - assembled and tested board

How to order?

You can order to us directly or by any of our distributors.
Check our web www.olimex.com/dev for more info.

Revision history

Board's Revision: Rev. A, May 2010

Manual's Revision: Rev. B, November 2011

                            - Added Programmers and Software in "BOARD
                            USE REQUIREMENTS" and in "BOARD
                            LAYOUT" the name of connector named "JTAG"
                            is changed to "SWD"

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